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RESEARCH ARTICLE

GNIDIA GLAUCA (FRESEN) GILG.: PHYTOCHEMICAL AND ANTIBACTERIAL VIEW

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ABSTRACT

Present investigation deals with an evaluation of phytochemical and antibacterial potential of *Gnidia glauca* (FRESEN) GILG.. Ethanol, petroleum ether and water were used for preparation of test extracts. The *Gnidia glauca* were found rich source of phytochemicals like alkaloids, saponin, steroids, tannin, coumarin, flavonoids, diterpenes, cardial glycosides, phenols and phytosterol. Among the extracts ethanolic extract of flowers of *Gnidia glauca* found to be rich in secondary metabolites after the aqueous once. An active antibacterial compounds were observed in ethanolic extract which shown significant antibacterial activity. The petroleum ether extract of flowers found most efficient. The study provides the surety about the use of *Gnidia glauca* in drug designing and antibiotics development.

INTRODUCTION

Medicinal plants are the effective source of secondary metabolites which are used in traditional as well as modern medicines. The living animals depend on the plants for their existence (Patil *et al*, 2014).

Evaluation of any drug is based on phytochemical and pharmacological approaches which lead to discovery of valuable drugs. Currently the focus on plant research has increased all over the world due to medicinal plants played a significant role in maintaining health and improving the quality of living life.

Secondary metabolites of medicinal plants stimulate the immune system, body's defense mechanism against viruses, bacteria and other disease-causing agents, phytochemicals also have a capacity to block the potential for carcinogens. The plants have played an important role in the drug development (Edeoga *et al*, 2005).

Gnidia glauca, commonly known as "Rametha" and its vernacular name is Datpadi. It comes under the Thymelaeaceae family, found in evergreen forests in the Western Ghats- throughout India, Sri Lanka and Africa. Kharat *et al*. have carried out qualitative phytochemical screening of the plant extracts (dried leaves, bark and stem) in various solvents such as aqueous, chloroform, methanol and buffer extract in 2013.

The present investigation was undertaken to evaluate the qualitative phytochemical content of the flower and leaves of *Gnidia glauca* using different solvents like water, ethanol and petroleum ether and also to check its antimicrobial activity.

MATERIALS AND METHODS

Collection and Authentication

Fresh and healthy leaves and flowers of *Gnidia glauca* were collected from the various localities of Chandgad Tahsil, Maharashtra, India during February 2015. The material was washed with purified water and completely shade dried. *Gnidia glauca* (FRESEN) GILG. was authenticated by Prof. R. S. Sawant, Head, Department of Botany, Dr. Ghali College, Gadhinglaj, Kolhapur district, (M.S.) India.

Preparation of extracts for Phyto-chemical analysis

150 gm of dried flowers and leaves of *Gnidia glauca* was mixed with 500 ml of ethanol and petroleum ether separately. After filtration, the filtrate was dried and used for phytochemical test. For water extract 150 gm of flowers and leaves powder were mixed with 1500 ml of distilled water and

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heat on water bath for 1/3 rd of original concentration and used for further analysis (Godghate and Sawant, 2014).

Table 1 Phytochemicals of Aqueous (A), Ethanolic (E) and Petroleum ether (PE) extract of flowers and leaves of *Gnidia glauca*

Sr. No.	Test	Results					
		Flower extract			Leaf extract		
		A	E	PE	A	E	PE
1	Alkaloids: Wagner's reagent	+	-	-	+	+	+
	Alkaloids: Hager's reagent	+	+	+	+	+	+
2	Saponin: Foam test	+	+	-	+	+	+
3	Steroids	+	+	+	+	+	+
4	Tannin: $FeCl_3$	-	+	-	-	+	-
5	Anthocyanin	-	-	-	-	-	-
6	Coumarin	+	+	-	-	-	-
7	Emodins	-	-	-	+	-	-
8	Protein	+	-	-	+	-	-
9	Amino acids	-	-	-	-	-	-
10	Flavonoids: Alkaline Reagent Test	+	+	-	-	-	-
	Flavonoids: NH_4OH	+	+	-	-	-	-
11	Diterpenes	+	+	-	-	+	-
12	Phytosterol	+	+	+	+	-	+
13	Phenols: $FeCl_3$ test	-	+	-	-	+	-
14	Phlobatannins	-	-	-	-	-	-
15	Leucoanthocyanin	-	-	-	-	-	-
16	Anthroquinone	-	-	-	-	-	-
17	Chalcones	-	-	-	-	-	-
18	Cardial Glycosides: Keller-Killani test	+	+	+	-	+	+
19	Carbohydrates: Barfoed's reagent	+	-	-	-	-	-
20	Acid	-	-	-	-	-	-

Key: (+) Positive test, (-) Negative test

Table 2 Antibacterial activity of Aqueous (A), Ethanolic (E) and Petroleum ether (PE) extract of *Gnidia glauca*

Organism used	Zone of inhibition (in mm)											
	Flower extract (10 %)						Leaves extract (10 %)					
	A		E		PE		A		E		PE	
	50µl	100µl	50µl	100µl	50µl	100µl	50µl	100µl	50µl	100µl	50µl	100µl
Salmonella typhimurium NCIM 2501	14.3±1.52	22.6±0.57	12.0±1.00	14.6±0.57	12.6±0.57	14.6±0.57	12.0±1.52	14.0±1.15	-	-	-	14.0±1.52
Bacillus cereus NCIM 2703	-	12.6±0.57	-	12.6±0.57	12.0±1.00	12.0±1.00	-	-	-	12.0±1.00	-	-
Staphylococcus aureus NCIM 2654		16.0±1.00	-	-	-	12.0±1.00	-	-	-	12.3±1.15	-	-
Proteus vulgaris NCIM 2813	-	-	-	12.0±1.15	-	16.0±0.57	-	-	12.0±1.15	18.6±0.57	-	-
Pseudomonas auruginosa NCIM 5032	20.0±1.00	25.0±0.57	-	-	12.0±1.52	12.0±1.52	-	-	-	-	-	-

Note: Each value is the mean of three readings ± SD.

Identification tests for Phyto-chemical analysis

The aqueous, ethanolic and petroleum ether extracts of the flowers and leaves from the plant were analyzed for qualitative phytochemicals analysis as shown in table 1 using standard methods (Damodaran and Manohar, 2012; Patil and Bhise, 2015; Harborne, 1923; Sawant and Godghate, 2013; [a]Patil *et al*, 2015; Sofowara, 1993).

Preparation of test extracts for antimicrobial activity

The aqueous, ethanolic and petroleum ether extracts of flowers and leaves of were prepared by addition of 1 gm of powder into 10 ml of respective solvents and kept at room temperature for overnight. Sample further used after centrifugation.

Test organisms

The standard test microorganisms used in this study were obtained from National Collection of Industrial Microorganisms, Pune, (M.S.) India are as following: *Salmonella typhimurium* NCIM 2501, *Bacillus cereus* NCIM 2703, *Staphylococcus aureus* NCIM 2654, *Proteus vulgaris* NCIM 2813 and *Pseudomonas auruginosa* NCIM 5032.

Preparation of bacterial suspension

Standard loop full suspension of the test organisms were aseptically streaked onto nutrient agar slants; incubated at 37°C for 24 hours. Bacterial growth was harvested from the respective slant and suspension was prepared using sterile 1ml

normal saline. The suspension stored in the refrigerator at 4°C until used ([b]Patil *et al*, 2015)[11].

Antibacterial activity

Antibacterial activity of the various test extracts were studied against the various microorganisms (Table 2) was determined by using agar well diffusion method by using Nutrient agar medium.

RESULTS AND DISCUSSION

Phytochemical analysis of aqueous, ethanolic and petroleum ether extracts of flowers and leaves from *Gnidia glauca* was carried out and obtained results were presented in Table 1. The aqueous extract of flower contains phytochemicals like alkaloids, steroids, saponin, coumarin, protein, flavonoids, diterpenes, phytosterol, cardial glycosides and Carbohydrates; the ethanolic extract shown presence of alkaloids, steroids, saponin, tannin, coumarin, flavonoids, diterpenes, phytosterol, phenols and cardial glycosides while petroleum ether extract found with alkaloids, steroids, phytosterol and cardial glycosides only. The aqueous extract of leaf contains secondary metabolites like alkaloids, steroids, saponin, emodins, protein and phytosterol; the ethanolic extract shown presence of alkaloids, saponin, steroids, tannin, diterpenes, phenols and cardial glycosides while petroleum ether extract observed with alkaloids, saponin, steroids, phytosterol and cardial glycosides. Aqueous and ethanolic extract of flowers found rich in phytochemicals among all.

Flavonoids shows anti-inflamatory, antimicrobial, antioxidant, vascular activities along with other medicinal properties (Harbonne and Willians, 2000) and it has been found only in aqueous and ethanolic extract of flowers. Several reports on the antimicrobial activity of flavonoids are available (Baez *et al*, 1999; Ogundipe *et al*, 2001; Xu HX and Lee, 2001). Tannin may be toxic to bacteria, yeast and filamentous fungi (Harborne, 1973), have potential antiviral (Lin *et al*, 2004) and antibacterial activity (Akiyama *et al*, 2001; Funatogawa *et al*, 2004) found only in ethanolic extract of both. The data Table 2 revealed that aqueous extract of flower of *Gnidia glauca w*as effective against all the bacteria except Proteus vulgaris, more specifically 100 µl of 10 % aqueous extract found effective. The ethanolic extract of flower found effective against *Salmonella typhimurium*, *Bacillus cereus* and *Peudomonas auruginosa* while, the petroleum ether (10 % of 100 µl) found effective against all the bacteria. Ethanolic leaves extract was effective (10 % of 100 µl) against *Bacillus cereus*, *Staphylococcus aureus* and *Proteus vulgaris* while aqueous and petroleum ether leaves extract was effective against *Salmonella typhimurium* only. The study shown presence of novel compounds in *Gnidia glauca*. The results obtained may support the use of *Gnidia glauca* in traditional medicine for the treatment of various diseases and drug developments.

CONCLUSION

The research concludes that flowers of *Gnidia glauca* are the rich source of valuable phytochemicals as compare with leaves. The ethanolic extract was estimated as efficient solvent for yielding high amount of phytochemicals while the entire flower extracts shown presence of significant antimicrobial compounds.

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